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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,950	03/07/2007	Fumie Sato	0171-1307PUS1	6810
2292 7590 01/11/2010 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER				
BOHATY, ANDREW K				
ART UNIT		PAPER NUMBER		
1794				
NOTIFICATION DATE		DELIVERY MODE		
01/11/2010		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

### Office Action Summary

**Application No.**

10/591,950

**Applicant(s)**

SATO ET AL.

**Examiner**

Andrew K. Bohaty

**Art Unit**

1794

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

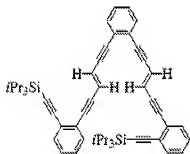
- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SI/200)
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_
- Paper No(s)/Mail Date: 2006/09/08; 2006/10/17

### ***Claim Rejections - 35 USC § 102***

6. Regarding claim 11, Nakano discloses these compounds can be used in lighting emitting diodes as the light emitting material (page 2376 paragraph the starts on the left column and finishes on the right column).

7. Claims 2, 5, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Wan et al. (Eur. J. Org. Chem. 2001, 3485-3490) (hereafter "Wan").

8. Regarding claims 2, 5, and 9, Wan discloses the following compound,



12

(compound 12, page 3486), which reads on the limitations

in claims 2, 5, and 9, where c is zero,  $b_1$ ,  $b_2$ ,  $m_1$ , and  $m_2$  are 1,  $R^2$ - $R^5$  are hydrogen,  $Z^1$ ,  $Y^1$ , and  $Y^2$  are benzene rings, and  $R^6$  is formula (2) where E is a substituted silyl group.

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

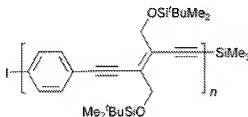
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1, 5-7, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Utesch et al. (Org. Biomol. Chem. 2003, 1, 237-239) (hereafter "Utesch") in view of Giesa et al. (Polymer International 1994, 33, 43-60) (hereafter "Giesa").

12. Regarding claims 1, 5-7, and 11, Utesch teaches a poly(diacetylene) compound



having the following structure,

where n is 2

(page 237 left column). This compound reads on the applicants' limitations in claims 1 and 5-7 where A and D are benzene,  $a_1$ ,  $a_3$ ,  $n_1$ , and  $n_2$  are 1,  $a_2$  is zero,  $R^1$  is a halogen, and  $R^6$  is represented by applicants' formula (2) where E is a substituted silyl group.

Utesch teaches that these materials have luminescent properties and can be used in the light emitting layer of electroluminescent devices (page 238 paragraph that starts on the left column and finishes on the right column).

13. Utesch does not teach where  $R^2$ - $R^5$  in applicants' formula (1) a hydrogen atom or an alkyl group having 1 to 10 carbon atoms.

14. Giesa teaches poly(diacetylene) compounds where in the groups that corresponds to applicants'  $R^2$ - $R^5$  can be hydrogen atoms or an alkyl group having 3 carbon atoms (page 48 compound 4, page 49 compound 9). Giesa teaches that poly(diacetylene)s have fascinating electrical and optical properties (page 43 left column first paragraph) and the materials are luminescent (Table 1). Giesa teaches that the substituents have an influence on the spectroscopic data, including changing the color of the light emitted (page 59 left column second to last paragraph).

15. Given the teaching of Giesa, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the groups that correspond to applicants'  $R^2$ - $R^5$  groups in Utesch, with hydrogen or an alkyl group containing 3 carbon atoms. Both Giesa and Utesch teach poly(acetylene)s and the use of the materials as luminescent materials. Giesa teaches the changing the substituents of the poly(acetylene) changes the spectroscopic properties of the materials. One would have been motivated to make the change in the R groups to change the spectroscopic properties of the materials.

16. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Utesch et al. (Org. Biomol. Chem. 2003, 1, 237-239) (hereafter "Utesch") in view of Giesa et al. (Polymer International 1994, 33, 43-60) (hereafter "Giesa") as applied to claims 1, 5-7, and 11 above, and further in view of Hwang et al. (J. Am. Chem. Soc. 2003, 125, 11241-11248) (hereafter "Hwang").

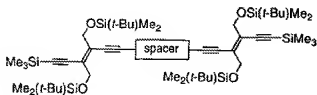
17. Utesch in view of Giesa does not teach where applicants' R<sup>1</sup> is a hydrogen atom and where A and D are a heteroaryl compound.

18. Hwang teaches poly(acetylene)s that comprise thiophene or pyridine groups as groups that corresponds to applicants' A and D (core) and Hwang further teaches that the groups that correspond to the A group can contain hydrogen groups as substituents (R<sup>1</sup> is hydrogen) (pages 11243 scheme 3). Hwang teaches that these materials have luminescent properties and are fluorescent and can be used in photonic devices, which includes electroluminescent devices (pages 11241 left column first paragraph). Hwang teaches that changing the groups corresponds to applicants' A and D dramatically changes the color of fluorescent emissive (page 11244 the only paragraph under conclusions heading).

19. Given the teachings of Hwang, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the poly(acetylene)s of Utesch in view of Giesa so the benzene groups were changed to thiophene groups of pyridine groups and the iodine group was changed to hydrogen. The motivation would have been to change the emissive properties of the poly(acetylene) compound to make a compound having the desired color.

20. Claims 2, 9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edelman et al. (Chimia 2001, 55, 132-138) (hereafter "Edelman") in view of Giesa et al. (Polymer International 1994, 33, 43-60) (hereafter "Giesa") and Hwang et al. (J. Am. Chem. Soc. 2003, 125, 11241-11248) (hereafter "Hwang").

21. Edelmann teaches poly(acetylene)s with the following structure,



, where the spacer can be a variety of

different compounds, including thiophene and pyridine (Fig. 7). Edelmann teaches that the poly(acetylene)s have luminescent/fluorescent properties and can be used as a layer in light emitting devices, such electroluminescent device (page 132 first paragraph). Edelmann teaches that the spacer can be changed to change the material properties of the poly(acetylene)s (page 136 left column, first paragraph under point 4).

22. Edelmann does not teach where the periphery are thiophene or pyridine groups instead of silyl groups (making applicants' R<sup>6</sup> hydrogen) and were the groups that corresponds to applicants' R<sup>2</sup>-R<sup>5</sup> are hydrogen atoms or alkyl groups of 1 to 10 carbon atoms.

23. Giesa teaches poly(diacetylene) compounds where in the groups that corresponds to applicants' R<sup>2</sup>-R<sup>5</sup> can be hydrogen atoms or an alkyl group having 3 carbon atoms (page 48 compound 4, page 49 compound 9). Giesa teaches that poly(diacetylene)s have fascinating electrical and optical properties (page 43 left column first paragraph) and the materials are luminescent (Table 1). Giesa teaches that the substituents have an influence on the spectroscopic data, including changing the color of the light emitted (page 59 left column second to last paragraph).

24. Hwang teaches poly(acetylene)s that comprise thiophene or pyridine groups on the periphery of the compound and corresponds to applicants' Y<sup>1</sup> and Y<sup>2</sup>, where R<sup>6</sup> in



either case is hydrogen (pages 11243 scheme 3). Hwang teaches that these materials have luminescent properties and are fluorescent and can be used in photonic devices, which includes electroluminescent devices (pages 11241 left column first paragraph). Hwang teaches that changing the groups in the core and on the periphery dramatically changes the color of fluorescent emissive (page 11244 the only paragraph under conclusions heading).

25. Given the teachings of Giesa and Hwang, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the poly(acetylene) compound of Edelmann, so the groups on the periphery are thiophene or pyridine and not silyl groups and the groups that correspond to applicants'  $R^2-R^5$  are a hydrogen atoms or an alkyl group containing 3 carbon atoms. The motivation would have been to change the luminescent/fluorescent properties of the poly(acetylene) to arrive at applicants' desired color.

26. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edelmann et al. (Chimia 2001, 55, 132-138) (hereafter "Edelmann") in view of Giesa et al. (Polymer International 1994, 33, 43-60) (hereafter "Giesa") and Hwang et al. (J. Am. Chem. Soc. 2003, 125, 11241-11248) (hereafter "Hwang") as applied to claims 2, 9, and 11 above, and further in view of Kaafarani et al. (J. Org. Chem. 2003, 68, 5377-5380) (hereafter "Kaafarani").

27. Edelmann in view of Giesa and Hwang does not teach where there are three acetylene groups connected to the central core group.

28. Kaafarani teaches a poly(acetylene) compound comprising a central core benzene unit which can either have 2 or 3 acetylene groups attached to it (page 5378 scheme 1). Kaafarani teaches the changing the number of acetylene groups attached to the central core changes the fluorescent properties of the materials, such as the emissive wavelength (Figure 1). Kaafarani teaches that the poly(acetylene)s have fluorescent properties and have used in electronic and photonic devices (page 5377 left column first paragraph).

29. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the poly(acetylene) of Edelmann in view of Giesa and Hwang so the core group, such as pyridine or thiophene, has three acetylene groups connected to it. The motivation would have been to alter the fluorescent properties of the compound, such as emissive wavelength.

### ***Conclusion***

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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